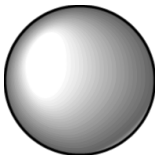
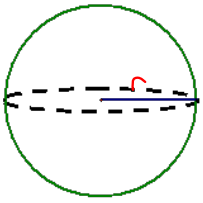
Spheres

Sphere-The set of all points that are a given distance (radius) to a given point (center).





$A = 4\pi r^2$

$V = \frac{4}{3}\pi r^3$

Ex:
r = 4cm

$A = 4\pi 4^2$
$64\pi \text{ cm}^2$

$V = \frac{4}{3}\pi 4^3$
$85\frac{1}{3}\pi \text{ cm}^3$
$\approx 268.1 \text{ cm}^3$

Ex:

$V = \frac{32000\pi}{3}\text{ cm}^3$

$A = \frac{1600\pi \text{ cm}^2}{4\pi 20^2}$

$3\sqrt{8000}$

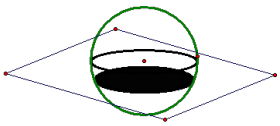
$V = \frac{4}{3}\pi r^3$
$\frac{32000\pi}{3} = \frac{4}{3}\pi r^3$
$32000 = 4r^3$
$8000 = r^3$
$20 = r$

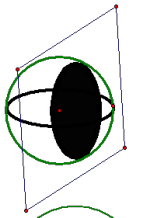
Ex:
$A = 12\pi \text{ cm}^2$

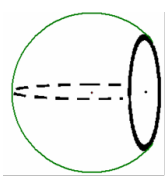
V = 21.8 cm³

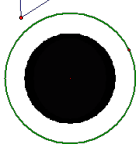
$12\pi = 4\pi r^2$
$3 = r^2$
$\sqrt{3} = r$
$V = \frac{4}{3}\pi(\sqrt{3})^3$

When a sphere and a plane intersect, the intersection is a circle. Try to imagine slicing an orange what two dimensional shape is left where you cut the slice-a circle. Also, imagine pouring water into sphere (but not filling it) what shape is the surface of the water-a circle. Shown are several views of the intersection





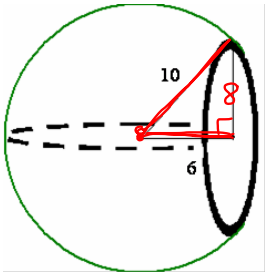




EX:
A plane intersects a sphere 6 cm from the center of the sphere. The radius of the sphere is 10cm. What is the area of the circle formed?

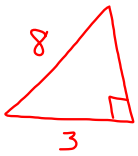
Radius of the circle = 8 cm
(Pythagorean thm.)
Area of the circle = $64\pi \text{ cm}^2$

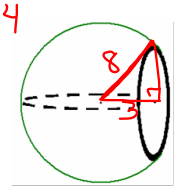
$10^2 = 6^2 + x^2$
$8 = x$



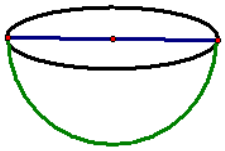
EX:
A plane intersects a sphere 3 cm from the center of the sphere. The radius of the sphere is 8cm. What is the area of the circle formed?

Radius of the circle = $\sqrt{55} \approx 7.4$ (Pythagorean thm.)
Area of the circle = 55π cm^2





The great circle occurs when the slice is taken at the hemisphere.

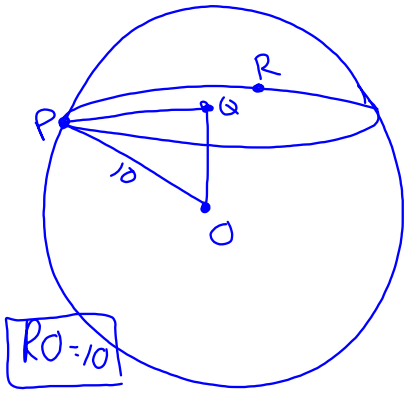


What is the TA of the hemishpere, if the area of the great circle is 16π?

$A = \frac{1}{2} A_{sphere} + A_{circle}$
$TA = \frac{1}{2} 4\pi r^2 + 16\pi$
$TA = 2\pi r^2 + 16\pi$
$TA = 2\pi(4) + 16\pi$
$TA = 48\pi$ u^2

$16\pi = \pi r^2$
$4 = r$

TA of hemisphere $= 3\pi r^2$



HW
p674-675 10-14, 17, 18,21,24
p 704 9, 10, 13-15